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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,892	02/20/2004	Yew-Chung Wu	BHT-3230-86	4249

7590 06/13/2005

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EXAMINER

SARKAR, ASOK K

ART UNIT	PAPER NUMBER
2891	

DATE MAILED: 06/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/781,892	WU ET AL.	
	Examiner	Art Unit	
	Asok K. Sarkar	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>6/9/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered. References 7 and 8 are not listed on IDS submitted.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract should be rewritten in proper English to disclose the invention clearly.

3. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms, which are not clear, concise and exact. The specification should be revised carefully in order to

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comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: For example the paragraph under the heading "Field Of the Invention" is not clearly stated in proper English. The entire specification including the claims should be written in proper English and should be grammatically correct.

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Method For Lifting GaN Epitaxial Layer Using Wafer Bonding Technique".

Claim Objections

5. Claim 1 is objected to because of the following informalities: The language of the claim limitations should be rewritten to convey clear meaning of the limitations of each steps. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

7. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The meaning of steps 4 – 6 are very confusing because of the language used. Incorporation of improper language in claim limitations renders the claim indefinite. However, for examination purposes, step 4 was taken as depositing a smooth ELOG GaN layer on the mask, step 5 was taken as bonding a clean transfer

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substrate to the GaN epitaxy layer and step 5 as separating the GaN layer bonded to the transfer substrate from the rest of the structure by etching the mask layer with an etching solution in view of the figures presented.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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11. Claims 1 – 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, US 6,177,359 in view of Nishio, US 6,627,552.

Regarding claim 1, Chen teaches a method for lifting Gallium Nitride (GaN) pseudomask epitaxy layer using wafer bonding technique comprising the steps of:

- (1) Depositing a buffer layer 12 on a substrate 11 (see Fig. 1A);
- (2) Depositing a mask layer 14 on said buffer layer of step (1) (see Fig. 1A);
- (3) Etching a pattern 14 on said mask layer of step (2) (see Fig. 1A);
- (4) Depositing a GaN layer 17 by epitaxial lateral overgrowth (ELOG) on etched mask layer (see Fig. 1B) of step (3) obtaining a smoothed surface to form a GaN epitaxial layer 17;
- (5) Obtaining a clean transfer substrate 18 by using wafer bonding to connect with said GaN epitaxial layer 17 (see Fig. 1D), and
- (6) Immersing said substrate, said buffer layer, said mask layer, said GaN epitaxial layer and said transfer substrate in etching solution and then separating said substrate, said buffer layer fromn the GaN epitaxial layer and the transfer substrate with reference to Fig. 1E in descriptions between column 2, line 53 and column 5, line 67.

Chen fails to teach the buffer layer as a low temperature buffer layer.

Nishio teaches a a low temperature buffer layer of GaN on sapphire substrate for the benefit of growing improved crystallographic quality GaN layer on the sapphire substrate in column 1, lines 52 – 65.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Chen and grow a low temperature GaN buffer layer for the benefit of growing improved crystallographic quality GaN layer on the sapphire substrate as taught by Nishio in column 1, lines 52 – 65.

Regarding claim 2, Chen teaches sapphire substrate in column 4, lines 13 – 15.

Regarding claims 3 and 6, Chen teaches depositing GaN in column 4, line 19, but fails to teach GaN layer comprises a thickness in the range of 200-500 microns by a temperature of 600 – 700 degrees Celsius and then depositing 1.5 micron – thick GaN by temperature in the range of 1000 – 1100 degrees Celsius.

Nishio teaches a low temperature buffer layer of GaN on sapphire substrate at thickness in the range of 200-500 microns by a temperature of 600 – 700 degrees Celsius for the benefit of growing improved crystallographic quality GaN layer on the sapphire substrate in column 1, lines 52 – 65 and also deposit then depositing 1.5 micron – thick GaN by temperature in the range of 1000 – 1100 degrees Celsius on the low temperature buffer layer of GaN in column 10, lines 47 – 67 for the benefit of growing improved crystallographic quality GaN layer.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Chen and grow a low temperature buffer layer of GaN on sapphire substrate at thickness in the range of 200-500 microns by a temperature of 600 – 700 degrees Celsius for the benefit of growing improved crystallographic quality GaN layer on the sapphire substrate as taught by Nishio in column 1, lines 52 – 65 and also deposit then depositing 1.5 micron – thick GaN by temperature in the range of

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1000 – 1100 degrees Celsius on the low temperature buffer layer of GaN as taught by Nishio in column 10, lines 47 – 67 for the benefit of growing improved crystallographic quality GaN layer.

Regarding claim 4, Chen teaches mask layer of SiO₂ or W in column 4, lines 26 – 29.

Regarding claim 5, Chen teaches etching a line pattern on the mask with reference to Fig. 1A.

Regarding claim 7, Chen teaches transfer substrate as Si in column 5, lines 13 – 20.

Regarding claim 8, Chen teaches wafer bonding in column 5, lines 12 – 18 that inherently depends on the transfer substrate.

Regarding claim 9, Chen teaches etching solution depending on the mask layer and the transfer substrate in column 5, lines 27 – 36.

Double Patenting

12. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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13. Claims 1 – 9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 – 27 of U.S. Patent No. 6,686,257. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of the instant invention corresponds to claim 5 of US 6,686,257 since claim 5 teaches the steps cited in claim 1 of the instant invention. Similarly, claim 2 of the instant invention corresponds to claim 2 of US 6,686,257. Claim 3 of the instant invention corresponds to claim 4 of US 6,686,257. Claim 4 of the instant invention corresponds to claims 7 – 9 of US 6,686,257. Claim 5 of the instant invention corresponds to claim 10 of US 6,686,257. Claim 6 of the instant invention corresponds to claims 5, 13 and 14 of US 6,686,257. Claim 7 of the instant invention corresponds to claim 17 of US 6,686,257. Claim 8 of the instant invention corresponds to claims 18 and 19 of US 6,686,257. Claim 9 of the instant invention corresponds to claim 20 of US 6,686,257.

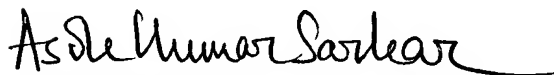
Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on 571 272 1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Asok K. Sarkar

June 8, 2005

Primary Examiner